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ABSTRACT

The present study investigated whether parents' own behaviors and beliefs or their interpretations of their children's behaviors relate more closely to children's own mathematics achievement beliefs. Age and sex differences in children's perceptions of their parents' beliefs were explored. A total of 740 children in fifth through twelfth grades completed a questionnaire assessing their achievement beliefs in mathematics (specifically, self-concept of math ability, perceived difficulty of math, importance and value of math, expectancies, and intentions to take more math). The questionnaire tapped children's beliefs about the degree to which their parents enjoyed and used math skills and children's perceptions of their parents' beliefs about themselves. Parents completed a questionnaire assessing their own beliefs about math, their backgrounds in math, their perceptions of their children's math abilities, the value and importance of math, and their expectancies for their child's math performance. Results indicated that parents' own achievement beliefs concerning mathematics and their backgrounds in math were not related to children's beliefs. However, parents' beliefs about their children were related to children's beliefs. Though parents may have contributed to girls' lower expectancies in math, they did not appear to influence directly either girls' or boys' intentions to take more math. Children seemed to have fewer sex-differentiated views concerning mathematics than their parents. (RH)

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Students' Perceptions of Their Parents' Beliefs Concerning Their Academic Competence

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Students' Perceptions of Their Parents' Beliefs Concerning Their Academic Competence

It is well known that parents can influence their children's achievement motivation, achievement values, and perceptions of competence (Crandall, 1969; Martin, 1973; Parsons, 1981). Many studies of parental influence have looked at parents' general childrearing practices, such as their values and goals for childrearing, general warmth and supportiveness in the home, discipline strategies, and independence training (see Martin, 1973; Parsons, 1981). These studies have shown that such variables do influence children's mastery orientation and general self-esteem; however, the general nature of the variables under investigation often makes it difficult to determine the exact nature of the influence.

Other reserachers have assessed the influence of more particular parental behaviors and beliefs on certain achievement behaviors and beliefs of children. For instance, Parsons, Adler and Kaczala (1982) assessed possible parental influences on children's achievement expectancies and other achievement attitudes. Several studies (e.g., Crandall, 1969; Montanelli & Hill, 1969; Parsons & Ruble, 1977) have shown that by the middle elementary school years girls tend to have lower expectancies for success than do boys, particularly on mathematics-related tasks. Parsons et al. (1982) were interested in asessing how parents might contribute to this difference. They suggested two main ways in which parents could have an influence: through role modeling or through their interpretations of their children's achievement outcomes.

Parents model a variety of activities for their children; by engaging in those activities and not others they likely influence what activities their children engage in. For instance, there is a good deal of evidence that when parents read frequently, become involved in their children's reading efforts, and provide reading materials in the home their children become better readers (Bing, 1963; Brezinski, 1964; Dix, 1976; Durkin, 1966; Hansen, 1969). In the mathematics area, Parsons, Adler, Futterman, Goff, Kaczala, and Meece (1983) and Parsons et al. (1982) have shown that fathers generally have had more experience with math, find math more useful, and think they are better at math than do mothers. The implication here is that children may observe that math is an activity males engage in more, and so boys would develop higher self-concepts of ability and have higher expectancies in math than girls, and thus be more likely to persist in math activities.

Parents also could influence children's achievement beliefs in the ways they interpret their children's achievement outcomes. Early work in the achievement motivation area showed that parents of boys high in achievement motivation had higher expectancies for their sons' performance and were more involved in their achievement efforts than were parents of sons low in achievement motivation, even when actual performance differences were controlled for (Rosen & d'Andrade, 1959). More recent work has obtained similar results (Herman, ter Laak, &

Maes, 1972; Nottleman, 1978). So parents who believe that children can do tasks, and are more involved in children's achievment efforts, have children with more positive achievement motivation and ability perceptions.

Several studies suggest that by the junior high and high school years, parents and teachers have higher educational expectancies for boys, particularly in mathematics subject areas (see Parsons, Ruble, Hodges, & Small, 1976). Parsons et al. (1982) found that parents of daughters believe math is harder for their daughters, even though they did not rate their daughters' math ability as lower than boys' math ability. Parents of sons think math is a more important subject than do parents of daughters. These results suggest that parents are giving different messages to their sons and daughters concerning the difficulty of math, its importance, and whether they should be best at it, and so could lead daughters to have lower expectancies for success in mathemetics.

Parsons et al. (1982) tested whether parents' own math behavior and beliefs or their interpretations of their child's achievement outcomes related more strongly to children's achievement beliefs concerning mathematics. Children in grades 5 - 11, and their parents, completed a questionnaire assessing a variety of achievement-related beliefs in mathematics. As just discussed, Parsons et al. found that mothers and fathers differed in how much they engage in math activities. Also, they hold different beliefs concerning how difficult math is for their sons versus their daughters. Correlations between parents' own behaviors and belefs and children's beliefs, and parents' interpretations of children's performance and children's own beliefs, showed that parents' interpretations of reality related much more strongly to children's beliefs. In fact, nearly all of the correlations between parents' own behaviors and beliefs and children's beliefs were nonsignificant. Parents' beliefs about their children and children's own beliefs were related in significant and meaningful ways; for instance, parents who believe their children are not very able in math have children who are low in their math ability perceptions. So it appears that parents' interpretations of their children's performance and their beliefs about children's math ability, values, etc., are more strongly related to children's beliefs than are parents' own mathematics activities and beliefs about mathematics.

The present study assessed a similar set of relationships to investigate further whether parents' own behaviors and beliefs or their interpretations of their children's behavior relate more closely to children's own mathematics achievement beliefs. Additionally, some age and sex differences in children's perceptions of their parents' beliefs were explored. In this study, children in grades 5 -12 (N = 740) completed a questionnaire that assessed their achievement beliefs in mathematics, including self-concept of math ability, perceived difficulty of math, importance and value of math, expectancies, and intentions to take more math. Additionally, the questionnaire tapped children's beliefs about the degree to which their parents enjoyed and used math skills, and children's perceptions of their parents' beliefs

about them, such as their perceptions of their parents' beliefs about their math ability. Parents (N = 500 for mothers, 470 for fathers) completed a questionnaire tapping their own beliefs about math (ability perceptions, importance of math, effort in math, usefulness of math), their background in math, and their perceptions of their children's math ability, value, and importance of math, and their expectancies for their child's math performance. On both questionnaires, each construct was assessed by several questions; the questionnaires are described in detail in Parsons, Adler, Futterman, Goff, Kaczala, Meece & Midgely, 1980).

The results of main interest here concern relationships among different sets of these variables. To provide a context for these results, some of the findings described by Toby Jayaratne in her paper in this series will be reviewed briefly. Parents in this sample hold sex-differentiated views of their own and their children's mathematics performance; fathers stated that they were better at math, and liked and used it more. While parents believed boys and girls have equal math ability, they stated that males tend to do better in math and have more use for it. Parents of sons had a more positive view of their child's math achievement. Though parents of daughters were less sex stereotyped in their views, they thought math was harder for their daughters. So mothers and fathers in this sample themselves had different perceptions of their own math performance and abilities, engaged differently in math activities, and held sex-differentiated views of their children's mathematics performance. These differences were quite similar to those reported by Parsons et al. (1982). As Jayaratne notes, these views were held even though girls in this sample were performing <u>better</u> in math than boys. So parents here could be modeling math behaviors differently, or interpreting reality differently for their sons and daughters.

To understand how parents might influence their children's beliefs, correlations between different sets of the parent and child variables were run. To assess the modeling hypothesis, correlational analyses were performed on parents' beliefs and performance in math and children's perceptions of their own performance in math. These correlations were done separately for mothers and fathers, and for both parents. Following Parsons et al. (1982), correlations were judged to be significant if they exceeded an absolute value of .3 and when p was less than .01. The .3 criterion was adopted because with a large sample size many small correlations can be statistically significant, though they may not be psychologically meaningful.

None of the correlations between parents' own beliefs, their occupational and educational backgrounds, or their use and enjoyment of math related significantly to children's beliefs. Several of the correlations between childen's perceptions of parents' use and enjoyment of math and parents' own beliefs were significant, indicating that children were relatively accurate in their perceptions of their parents' involvement with math activities. However, the direct modeling hypothesis that parents may influence children's achievement beliefs for math through their own beliefs and behaviors

received little support, mirroring the findings of Parsons et al. (1982).

To assess parents' influence as interpreters of reality, correlations were run between parents' perceptions of children's performance and children's own beliefs. Many of the correlations were significant. Table 1 presents relationships between children's beliefs about their math performance and parent' beliefs about their children. As can be seen in the table, the parent variables relating most strongly to children's beliefs are those concerning perceived ability and performance, expectancies, and difficulty and effort (the correlations are negative for these latter two variables). This set of parent variables relates less strongly to children's value concepts and intentions to take more math than to the other child variables. The next strongest set of correlations is between parents' perceptions of how important their child thinks math is and the child's expectancies. However, the importance parents attach to their child doing well is essentially uncorrelated with any of the child variables; parents simply believing math is important does not relate to children's own beliefs. Finally, the correlations between mothers' responses and children's responses are generally somewhat higher than those between fathers' responses and childrens's responses, though many of the differences are slight. Since mothers likely have more interactions with children, their perceptions of their children should be more closely related to children's own perceptions.

Table 2 presents the correlations between parents' beliefs about their children and children's perceptions of their parents' beliefs. Many of the correlations are significant, indicating that there is fairly good correspondence between children's perceptions of their math performance and parents' beliefs about their children. This is particularly true in the case of parents' expectancies and children's perceptions, and parents' ability beliefs and children's perceptions. Parents' perceptions of the importance of math for their children relates only to children's perceptions of parents' ability beliefs. Once again, the importance parents attach to their child doing well does not relate to any of the children's perceptions. As was the case in the previous analysis, mothers' beliefs are somewhat more strongly related to children's perceptions than are fathers' beliefs.

Table 3 presents correlations between children's own beliefs and their perceptions of their parents' beliefs about them. The reason for examining these correlations is that we believe parents' influence on children's beliefs is mediated by children's perceptions of those beliefs (see Parsons et al., 1983). That is, parents do not have a direct influence on children's beliefs; instead, children interpret messages they receive from parents, and their interpretations influence their own beliefs. Looking at Table 3, generally these correlations are stronger than those between the parent and child variables. As with the parent variables, the strongest correlations are between children's own ability perceptions, expectations, and perceptions of task difficulty and their perceptions of their parents' beliefs. The relationships are weaker between the perceived parent variables and the child's math value, with significant relationships

Correlations of Children's Achievement-Related Beliefs

and Parents' Beliefs About Their Children[a]

	Child's Current Math Expectancy	Child's Future Math Expectancy	Child's Perceived Performance In Math	Child's Math Ability Concept	Child's Math Task Concept	Child's Math Value Concept	Child's Intention to Take More Math
Parent Variables							
Perception of Importance of Math for Child	.27 .20	.35** .31**	.24 .21	.29 .23	-.11 -.07	.20 .20	.27 .21
Perception of Child's Math Ability	.28 .21	.44** .35**	.36** .29	.43** .32**	-.33** -.22	.22 .14	.27 .26
Perception of Child's Math Effort	-.31** -.27	-.32** -.28	-.34** -.31**	-.42** -.37**	.42** .42	-.14 -.11	-.15 -.13
Perception of Difficulty of Math for Child	-.34** -.31**	-.38** -.39**	-.39** -.37**	-.47** -.43**	.41** .40**	-.19 -.16	-.22 -.15
Importance of Child Doing Well In Math	-.01 -.03	.05 -.03	.02 -.02	.04 -.02	.01 .03	.11 .03	.11 -.04
Expectancy for Child's Math Performance	.32** .31**	.44** .43**	.38** .34**	.44** .42**	-.33** -.28	.18 .22	.25 .31**

[a]The top row of correlations is for mothers' responses and children's responses, and the bottom row is for fathers' responses and children's responses. Asterisks indicate correlations greater than .30 and a p value less than .01.

Table 2

Correlations of Parents' Achievement-Related Beliefs About Their Children and Children's Perceptions of Those Beliefs[a]

	Child's Perception of Parents' Belief About Child's Math Ability	Child's Perception of Parents' Belief About Difficulty of Math for Child	Child's Perception of Parents' Expectancy for Child's Math Performance
Parent Variables			
Perception of Importance of Math for Child	.40** .32**	-.13 -.12	.22 .15
Perception of Child's Math Ability	.54** .46**	-.33** -.27	.31** .27
Perception of Child's Math Effort	-.37** -.32**	.35** .38**	-.28 -.29
Perception of Difficulty of Math for Child	-.42** -.40**	.35** .37**	-.29 -.30
Importance of Child Doing Well in Math	.08 .04	-.01 .07	.06 -.06
Expectancy for Child's Math Performance	.52** .49**	-.33** -.30	.32** .33**

[a]The top row of correlations is for mothers' responses and children's responses, and the bottom row is for fathers' responses and children's responses. Asterisks indicate correlations greater than .30 and a p value less than .01.

Table 3

Correlations of Children's Achievement-Related Beliefs and Their Perceptions of Parents' Beliefs About Them [a]

	Child's Perception of Parents' Belief About Child's Math Ability	Child's Perception of Parents's Belief About Difficulty of Math for Child	Child's Perception of Parents' Expectancy for Child's Math Performance
Child's Current Math Expectancy	.51** .48** .53**	-.34** -.35** -.31**	.63** .56** .68**
Child's Future Math Expectancy	.60** .60** .59**	-.34** -.36** -.32**	.57** .58** .57**
Child's Performance in Math	.53** .53** .53**	-.38** -.40** -.36**	.58** .55** .60**
Child's Math Ability Concept	.60** .61** .59**	-.49** -.53** -.44**	.65** .63** .67**
Child's Math Task Concept	-.36** -.42** -.29	.56** .67** .46**	-.36 -.41 -.31**
Child's Math Value Concept	.37** .39** .36**	-.14 -.13 -.15	.42** .36** .49**
Child's Intention to Take More Math	.23 .29 .17	-.11 -.13 -.09	.17 .22 .12

[a]The top row of correlations is for all subjects, the middle row for girls, and the bottom row for boys. Asterisks indicate correlations greater than .30 and a p value of less than .01.

between perceptions of parents' ability beliefs and expectancies significant, but lower. The correlations are weaker still for intention to take more math and the perceived parent variables, with none significant. The correlations are relatively similar for boys and girls, except for those between the child's task concept (a measure of task difficulty) and the perceived parent variables; these relationships are stronger for girls.

Finally, age and sex differences in children's perceptions of parents' beliefs about them, and parents' use and enjoyment of math, were assessed. Generally, there were few age and sex differences in children's perceptions. Boys tended to be more sex-steroeotyped, believing mothers use and like math less than girls did. This was particularly true among the boys in elementary and junior high school. The strongest sex differences occurred at the 10th grade, where girls stated their parents believed they (the daughters) were less able at math than boys, had lower expectancies for their performance, and thought math was less important for them than for boys. Also, girls' perceptions of their parents' beliefs about them showed more of a decline than did boys' beliefs, indicating that girls were becoming more negative in their perceptions. These results suggest that girls are more pessimistic than boys in their perceptions of their parents' beliefs about them; however, many of the differences were nonsignificant, and so in fact girls and boys were more similar than different. Also, compared to their parents, the boys and girls in this study were much less sex-differentiated in their perceptions of their parents' beliefs about them. Perhaps girls are beginning to believe they can do as well in math as boys, as some of our cultural stereotypes begin to change.

In summary, parents' own achievement beliefs concerning mathematics, and their background in math, were not related to children's beliefs. These results were quite similar to those of Parsons et al. (1982), and so also do not support the hypothesis that parents influence children's beliefs through role modeling, at least among children in this age range. Parents' beliefs about their children, particularly their perceptions of children's ability, the difficulty of math for children, and their expectancies for future success, related to children's own beliefs. These results also were similar to those of Parsons' et al. (1982), and suggest that parents influence children's beliefs more through the messages they provide to children; that is, as interpreters of reality. Given that parents have sex differentiated views of their own mathematics performance, and think math is harder for girls than for boys (as reported by Parsons et al., 1982 and Jayaratne in this series), the results here suggest that parents socialize girls to think math is harder for them, and so girls will have lower expectancies in math, as has often been reported. However, though parents may contribute to girls' lower expectancies in math, they do not appear to influence girls' (or boys') intentions to take more math. Few of the correlations between parents' beliefs and the child's intention to take more math were significant. If parents do influence intention to take more math, the influence is indirect. Ongoing analyses are assessing the nature of this influence. Also, children seem to have less sex-differentiated

views concerning mathematics than do their parents, perhaps reflecting that it is now more culturally acceptable for girls to persist in mathematics.

Several issues remain to be assessed. One is whether the relationships reported here differ across age. Ongoing analyses are assessing the relationships between parent and child beliefs separately for elementary, junior high, and high school students in the sample. We predict that the relationships will be stronger among the younger children, since parents should have a stronger influence on children's beliefs earlier on. Also, we believe that parents may be more likely to serve as role models earlier on, particularly in the preschool and early elementary school years. As children get older, other models, and other kinds of learning experiences, become more important. Though the modeling hypothesis did not receive much support here, that could be due in part to the ages of the children in the sample.

Another issue is the bidirectionality of the influence between parent and child beliefs. While parents certainly can influence children's beliefs, children's beliefs likely influence parents' perceptions as well (see Bell, 1968). This may be particularly true at important transitions in children's lives, such as when they move from elementary to junior high school, or junior high to senior high. As they make these transitions, children probably report to parents what their new classes are like, how they are doing, and so on, which will influence parents' beliefs. Since both parents and children completed the questionnaire once each year for two years, we can assess the bidirectionality of influence between parent and child beliefs.

Perhaps the most important issue is how parents give messages to their children that influence children's beliefs. There is a need to assess parent-child interactions to begin to understand the ways in which parents influence children's beliefs (or children influence parents' belief). Our work has shown that certain beliefs, such as ability perceptions, expectancies, and task difficulty inferences, are critical mediators of math performance and choice. Other work has shown that parental involvement with children in their achievement activities has positive effects. We now need to investigate further the kinds of behaviors socializers engage in, to better understand how they communicate their beliefs to children and the ways in which they involve themselves in children's achievement activities.

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